TAHOE NATIONAL FOREST, AMERICAN RIVER RANGER DISTRICT

SUNNY SOUTH PROJECT

FIRE & FUELS SPECIALIST REPORT

Introduction

Purpose and Scope

The purpose of this report is to analyze and compare predicted current and future wildfire characteristics from the proposed alternatives (action and no action) addressed in the Sunny South Project Decision Memo (DM) on the American River Ranger District, Tahoe National Forest, Placer County, California. In particular, this analysis will focus on the following effects:

- The direct effect of the proposed action and no action alternatives on existing and future wildfire potential characteristics within the treated areas.
- The indirect effect of the proposed action and no action alternatives on existing and future wildfire characteristics and probable control options adjacent to the treated areas.
- The cumulative effect of the proposed action and no action alternatives on existing and future wildfire potential characteristics within the Sunny South Analysis Area.
- The direct, indirect and cumulative effects of the proposed action and no action alternatives on air quality.

Background

The vegetation within the project area consists primarily of 50 year old ponderosa pine plantations and dense mixed conifer stands; elevations range from 3,000 to 4,500 feet. Some of the project area stands are currently being affected by bark beetle infestations while others are at risk from future and spreading infestations.

Fuel treatments to reduce the extent and risk of insect infestations, as well as to reduce the negative effects of those infestations on forest health and resilience, are proposed on 3,000 acres of National Forest System (NFS) lands. Proposed treatments include: thinning of at risk stands, prescribed burning, and removal of insect affected dead and dying trees.

Insect infested trees in and near Big Oak Flat and in the municipal watershed of Sugar Pine Reservoir represent an increasing fire hazard. Pockets of standing dead and beetle infested trees are expanding in size and frequency. The Sugar Pine area, popular for recreational camping and fishing, is a major destination for off-highway vehicle riders using NFS trails and roads. It is important to maintain quality recreation opportunities on trails and at developed sites within the project area while managing the vegetation and treating hazardous fuels.

The Sunny South project is situated within landscape areas designated by the Chief of the Forest Service on November 24, 2015 as part of an insect and disease treatment program in accordance with Title VI, Section 602, of the Healthy Forest Restoration Act (HFRA), as amended by Section 8204 of the Agriculture Act (Farm Bill) of 2014.

Prior to European settlement, the average natural fire return interval for the Sunny South project area ranged from 7 to 59 years, with most of the landscape burning less than 16 years (Safford et. al., 2011). The landscape has been heavily influenced over the last 100 years by mining, grazing, logging, and fire suppression activities. Post-fire salvage logging and reforestation projects following the Volcano Fire (1960) have established a mature plantation of primarily ponderosa pine over the majority of the Sunny South analysis area. While recent vegetation management projects (Shirttail Succor Oak, 2004; North Divide, 2009; Deadwood, 2011) have begun to reduce stand density and reestablish a mixed conifer forest in the Volcano Fire area, historic fire suppression and logging practices have resulted in overstocked stands with high accumulations of surface fuels, often under an unbroken "fuel ladder" of understory vegetation extending to the forest canopy.

Illustration 1 below shows the Sunny South project area, with historic fire areas shown from 1960.

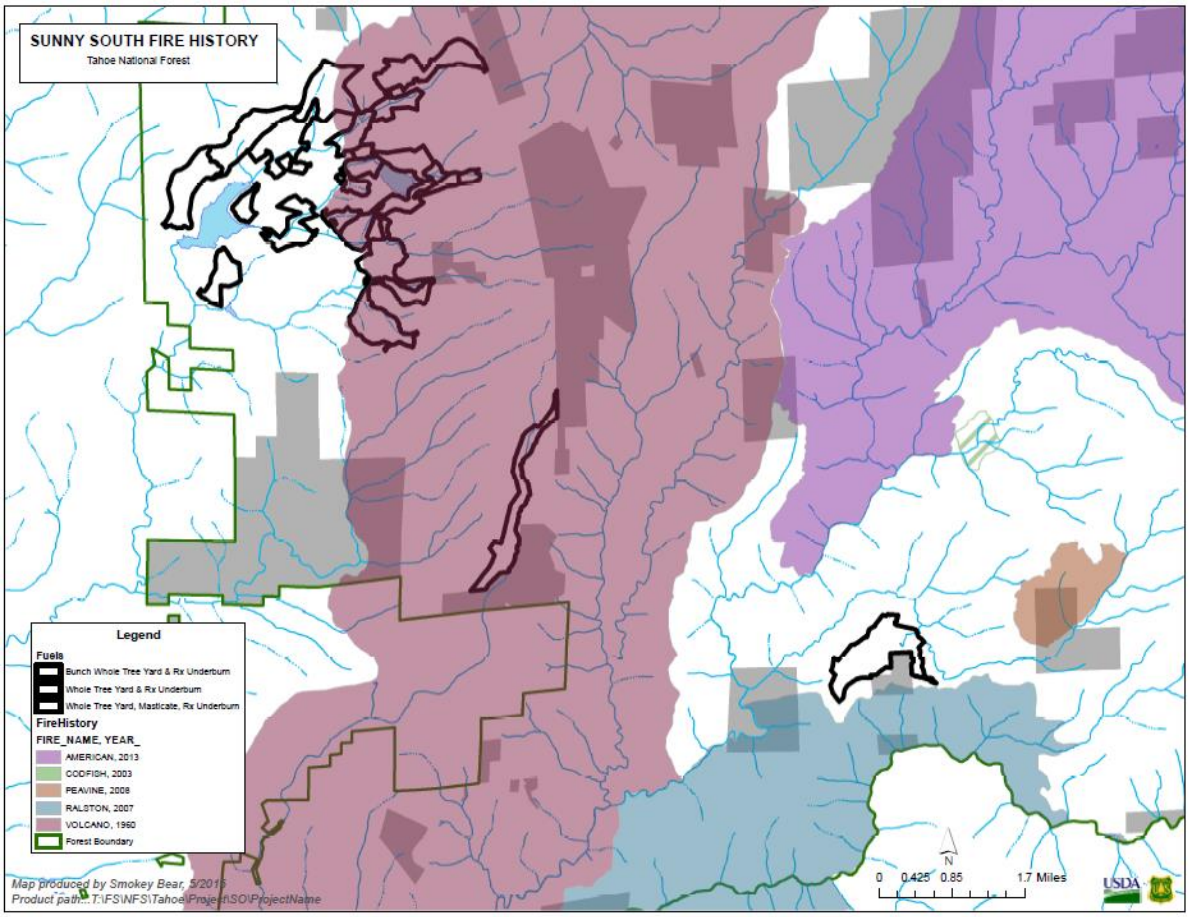


Illustration 1. Sunny South Project Area Fire History

Fire Regime Condition Class

Fire Regime Condition Class (FRCC) is a measure of the extent to which contemporary fires (i.e. since 1908) are burning at frequencies similar to the frequencies that occurred prior to Euro American settlement, with the mean reference fire return interval as the basis for comparison. Mean Condition Class (CC) Departure categorizes degree of fire return interval departure from historic conditions using the following scale: 0 to 33 percent departure equals CC1; 33 to 67 percent departure equals CC2; and greater than 66 percent

departure equals CC3. Negative condition classes (i.e. where fires are burning more often that under pre-settlement conditions) are categorized on the negative of the same scale: 0 to negative 33 percent equals CC-1, negative 33 to negative 67 percent equals CC-2, less than negative 67 percent equals CC-3. CC1 and CC-1 are mapped in the same class because they are both within 33 percent of the mean pre-settlement value.

Illustration 2 shows the current FRCC for the Sunny South Project Area. While recent vegetation management projects are shown to be moving the landscape toward healthier fire regimes, most areas are still over 66 percent departed from historic, fire adapted conditions. Fuel accumulation associated with this departure increase the probability of unnaturally large, high intensity fires.

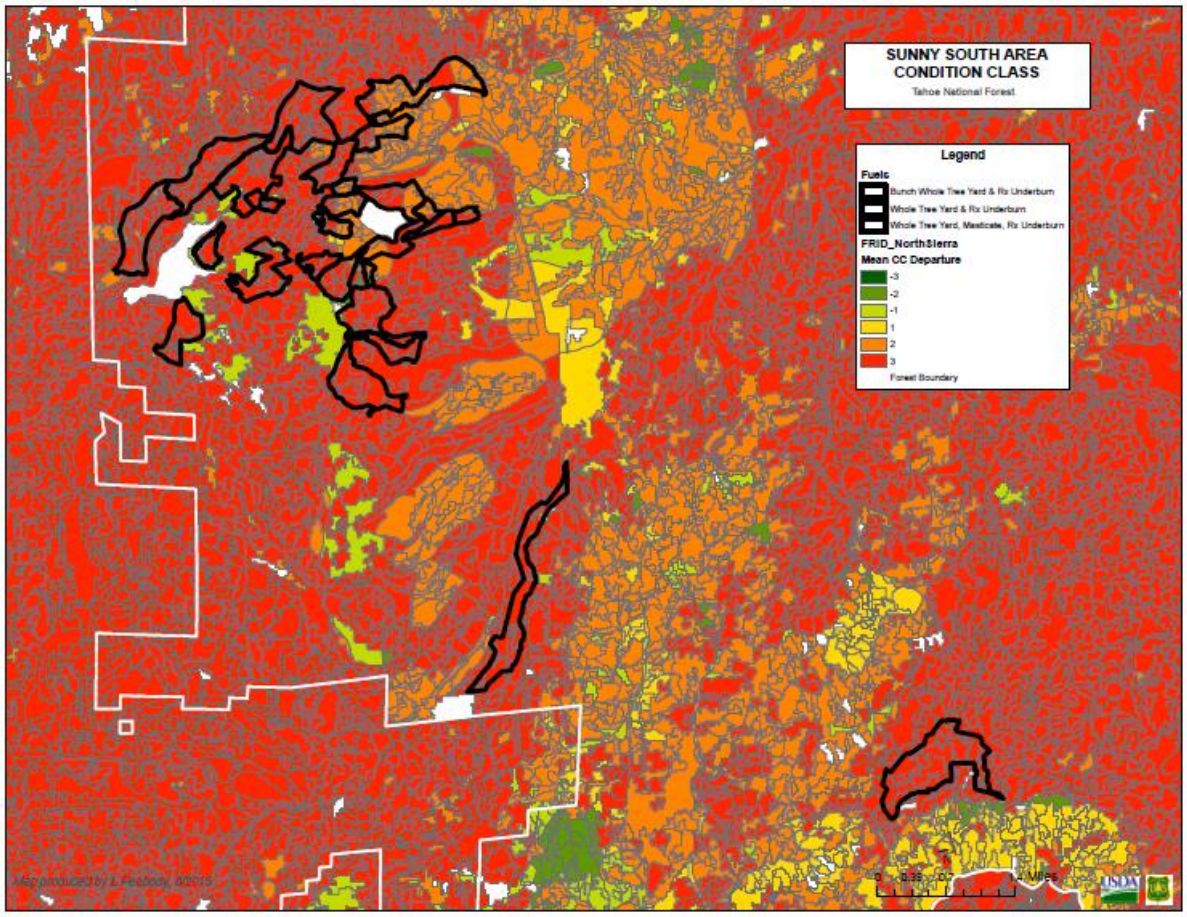


Illustration 2.

Guiding Regulations and Policies

The Sunny South project is designed to fulfill the management direction specified in the Agriculture Act (Farm Bill) of 2014, as well as the management direction specified in the 1990 Tahoe National Forest Land Resource Management Plan (LRMP) as amended by the 2004 Sierra Nevada Forest Plan Amendment (SNFPA). Proposed management activities are designed to comply with the standards and guidelines as described in the LRMP and SNFPA.

The Sunny South project area falls within ten Management Areas (MAs) described in the LRMP:

Management Area 84 (Humbug-Sailor). This MA is located on the gently to moderately sloped uplands overlooking the North Fork of the American River canyon. The major resource emphasis for this MA is vegetation management.

Management Area 90 (Divide). This MA encompasses the Foresthill Divide Road from the Chicken Hawk area to the junction of the Soda Springs Road. Roadside visual quality and fuel break construction and maintenance are major resource management emphases for this MA.

Management Area 94 (Elliot). This MA is located approximately 10 miles north of Foresthill, in the headwaters of Shirttail Canyon. In 1970, the Pacific Southwest Forest and Range Experiment Station established a long-range, levels-of-growing-stock study in the (Volcano Fire reforestation) pine plantation. The major resource emphasis for this MA is to continue silvicultural research.

Management Area 95 (Macy). This MA is encompassed by the Tahoe National Forest boundary on the west, Giant Gap Ridge and Giant Gap Gulch on the north, and the area north of Sugar Pine Reservoir on the south. The area includes National Forest System land adjacent to 378 acres of land acquired by the Bureau of Reclamation as a part of the Sugar Pine Reservoir project. The major resource emphasis for this MA is wildlife habitat mitigations.

Management Area 96 (Sugar Pine). This MA is located 8 miles north of Foresthill. It includes Sugar Pine Reservoir and the land which forms the view and use area near the reservoir, as well as the Sugar Pine road foreground corridor extending east to The Sugar Pine off-highway vehicle (OHV) parking area. Recreation facilities have been open to the public since 1985. Two family campgrounds (with a total of 60 units), two 50 person group campgrounds, 25 picnic units, a beach, boat ramp, and 4 miles of handicapped-accessible trails comprise the developed sites. There is also heavy OHV use on a network of trails and staging areas nearby. The major resource emphasis for this MA is recreation management.

Management Area 97 (Big). This MA is located 9 miles northeast of Foresthill. It includes Big Reservoir and The Morning Star Campground. The major resource emphasis for this MA is recreation management.

Management Area 98 (Eldorado). This MA is located primarily in the Middle Fork of the American River watershed. This MA Contains Gorman Ranch, The town of Michigan Bluff**,** several homes and private properties on Chicken Hawk Ridge and Codfish Point, the historic Deadwood Town site, and the Western States Trail. In 1960, The Volcano Fire burned about 44,000 acres across the Foresthill Divide to the North Fork of the American River. Most of the gentler slopes have been reforested. Vegetation consists of pure pine or mixed conifer plantations In the Gorman Ranch and Mitchell Mine areas, and knob cone pine or mixed confer stands alternating with hardwoods or brush on steeper slopes below Michigan Bluff. The continuous fuel beds in the Volcano Fire plantation, natural timber stands, and brush fields, combined with the increasing volume of insect killed timber, pose a serious safety concern for firefighters working in this wildland urban interface (WUI). Timber and range management are major resource management emphases for MA 98

Management Area 99 (Mosquito). This MA contains the roadside corridor (visual foreground) of the Mosquito Ridge Road from the western forest boundary to Red Star Ridge. Roadside visual quality and fuel break construction and maintenance are major resource management emphases.

Management Area 103 (West Orchard). This MA is located approximately five miles northeast of Foresthill on the Foresthill Divide Road. The MA surrounds the Foresthill Divide Seed Orchard and acts **as** a buffer zone, preventing wind-blown white fir, Douglas-fir, and sugar pine pollen from entering the seed orchard. Silviculture is the primary management emphasis for MA 103.

Management Area 106 (Big Oak). This MA is encompassed by Peavine Creek on the north and east, the North Fork of the Middle Fork American River on the west, and Mosquito Ridge on the south. A few houses and trailers are located on a total of forty acres of subdivided private land within the management area. Regulated timber management, coordinated to meet wildlife habitat requirements is the primary management emphasis for MA 106.

Management Goals and Strategies

The 2004 SNFPA Appendix A, Part D directs the forests to "determine the need for ecosystem restoration projects following large, catastrophic disturbance events" (including insect infestation). Objectives for restoration projects may include limiting fuel loads over the long term, restoring habitat, and recovering economic value from dead and dying trees.

Broad-scale goals include:

- Treating fuels in a manner that significantly reduces wildland fire intensity and rate of spread, thereby contributing to more effective fire suppression and fewer acres burned
- Reducing hazards to firefighters by managing snag levels in locations likely to be used for control in prescribed fire and fire suppression.
- Providing a buffer of defensible space between developed areas and wildlands.

Overall Sunny South Project objectives for fire and fuels management include:

- Reducing volume of standing dead timber, thereby reducing the danger and difficulty of managing future wildfires.
- Reducing snag hazards on roads, trails and other areas that typically provide access, egress and staging areas for fire suppression, fuels management, and other forest operations and projects.
- Reestablishing the fuel characteristics of resilient, fire-adapted forests.

Intensity Criteria Pertaining to Resource

The effects of treatment on fuels and potential fire behavior are evaluated using the following measurement indicators.

Flame Length: Flame length (measured in feet) is influenced by fuel type, fuel arrangement, fuel moisture, and weather conditions. Fuel type and fire intensity in turn influence fire line production rates by different suppression resources. Increased flame lengths indicate an increase in fire intensity and the likelihood of high mortality. Predicted flame lengths under four feet, under extreme fire weather conditions represent acceptable conditions for fire and fuels management.

Rate of Spread: The relative activity of a fire in extending its horizontal dimensions. It is expressed as rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in burned area. Usually it is expressed in chains (66 feet) per hour for a specific period in the fire's history. Predicted rates of spread less than ten chains per hour, under extreme fire weather conditions represent acceptable conditions for fire and fuels management

Fireline Intensity: The numerical product of a fire's rate of spread, fuel consumption, and heat yield at a given point on a fire's perimeter. Fireline intensity is used to assess the difficulty of wildfire containment, as well as the predicted degree of tree mortality. Predicted fireline intensity below 500 British Thermal Units (BTU) per foot per second, under extreme fire weather conditions represent acceptable conditions for fire and fuels management

Tools Used to Predict Impacts

Effects of the proposed alternative on fuels and future wild fire characteristics are compared to the no-action alternative. The BehavePlus fire modeling system is a program that uses a collection of mathematical models that describe fire and the fire environment. BehavePlus is the successor to the BEHAVE fire behavior prediction and fuel modeling system (Andrews 1986, Andrews and Chase 1989, Burgan and Rothermel 1984, Andrews and Bradshaw 1990). Primary modeling capabilities include flame length, rate of spread, and fireline intensity.

Representative fuel models were determined through comparison of photographs taken in treatment units to reference fuel model types and fuel model data from Forest Service General Technical Report RMRS-GTR-153; Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model (Scott and Burgan, 2005). Two fuel types where determined to represent the majority of the treatment and surrounding analysis areas:

1. Fuel Model TU5, Very High Load, Dry Climate Timber-Shrub. The primary carrier of fire is heavy forest litter with a shrub or small tree understory.

TU5 (165)

Very High Load, Dry Climate Timber-Shrub

Above: Photos from RMRS-GTR-153
Below: Photos from the Sunny South treatment area

2. Fuel Model TL5, High Load Conifer Litter. The primary carrier of fire is high load conifer litter; light slash or mortality (insect killed) fuel.

TL5 (185)

High Load Conifer Litter

Above: Photos from RMRS-GTR-153
Below: Photos from the Sunny South treatment area

Assumptions Made:

- Fuel models used are representative of the Sunny South Project area.
- Model outputs predict existing and future potential wildfire effects under severe and moderate fire weather and fuel moisture conditions within the treatment areas.
- Thinning and follow-up fuels treatments will generally result in a fuel profile best represented by RMRS-GTR-153 TL1, Low Load Compact Conifer Litter. The primary carrier of fire in TL1 is compact forest litter, 1 to 2 inches deep. TL1 is often used to represent a recently underburned forest. Examples of completed treatments similar to those proposed in the Sunny South Project are found in the North Divide, Deadwood, and Shirttail Succor Oak Vegetation Management projects near the Sunny South Project.

TL1 (181)

Low Load Compact Conifer Litter




Above: Photos from RMRS-GTR-153
Below: Photos from the North Divide treatment area

Alternative 1, the Proposed Action

Ground-based harvesting and follow-up fuels treatments

- Trees greater than ten and up to thirty inches in diameter at breast height (dbh) would be considered for commercial timber harvest.
- To the greatest extent possible, activity generated fuels (logging slash, etc.) will be removed through whole tree harvest practices and/or follow up fuels treatments.
- Prescribed burning would be used as a follow-up fuels treatment in the treated stands.
- Underburning will primarily be used to reduce surface and ladder fuels. Hand piling and pile burning, instead of or in conjunction with underburning will be used where appropriate to meet fuel management objectives.

- Handline construction, tree pruning, and removal of ladder and surface fuels may be used to protect fire intolerant trees, wildlife habitat or sensitive sites, and to facilitate prescribed burning operations.
- In areas where prescribed burning alone will not meet management objectives, mechanical treatments may be used instead of, or prior to prescribed burning. Mechanical treatments may include masticating, or machine piling and burning surface and ladder fuels.
- Piles may be burned under conditions where the fire would be allowed to spread and effectively reduce surface fuels in portions of the stand concurrently.

Cable harvesting and follow-up fuels treatments

- Trees greater than ten and up to thirty inches dbh would be considered for commercial timber harvest.
- Following harvest activities, these units would be evaluated for follow-up fuels treatment. Where suitable and warranted to meet fuels objectives, units may be prescribed burned, or hand piled and burned.
- Underburning will primarily be used to reduce surface and ladder fuels. Hand piling and pile burning, instead of or in conjunction with underburning will be used where appropriate to meet fuel management objectives.
- Handline construction, tree pruning, and removal of ladder and surface fuels may be used to protect fire intolerant trees, wildlife habitat or sensitive sites, and to facilitate prescribed burning operations.
- All stem material greater than six inches diameter would be removed, with the exception of broken portions of logs and tops less than eight feet in length.
- Within 50 feet of main system roads, surface and ladders fuels less than 10 inches dbh would be felled, piled and burned; or chipped and scattered on site or removed as biomass.
- Piles may be burned under conditions where the fire could be allowed to spread and effectively reduce surface fuels in portions of the stand concurrently.

Alternative 2, No Action

- No treatments would occur in any areas.

DIRECT, INDIRECT AND CUMULATIVE EFFECTS ANALYSIS

Alternative 1, Proposed Action

Sunny South project area includes approximately 5,800 acres of national forest land. Within this area, approximately 2,737 acres (46 percent) would be treated. 2,455 acres (42 percent) would host ground-based thinning and follow-up fuels treatment operations. 239 acres (three

percent) would host cable thinning and follow-up fuels treatment operations. 43 acres (one percent) would host prescribed fire only fuels treatment operations.

Summary of the Sunny South Project proposed action treatment activities

Treatment	Acres
Ground-based thinning and follow-up fuels treatment units	2,514
Cable thinning and follow-up fuels treatment units	239
Total Acres	**2,753**

[1]

Direct and Indirect Effects Analysis

Thinning and underburning

Treatment in these areas is assumed to consist of varying degrees of thinning from below and removal of trees up to thirty inches dbh with appropriate consideration given to existing and expected insect caused mortality, logging system limitations, residual canopy cover, hardwood release, and riparian area protection. In the majority of the treated stands, whole tree yarding and prescribed burning would be used as follow-up fuels treatments.

Thinning, piling, pile burning, and underburning

Treatment in these areas is assumed to consist of thinning to the same specifications with whole tree yarding, pile burning and underburning as follow-up fuels treatments. While prescribed burning alone would be used as a follow-up fuels treatment in the majority of the treated stands, some treatment areas are identified for "machine pile, pile burn and underburn" follow-up fuels treatments. Piles may be burned under conditions where the fire could be allowed to spread and effectively underburn portions of the stand concurrently. Additional prescribed underburns would be implemented as needed to meet fuels management forest health goals.

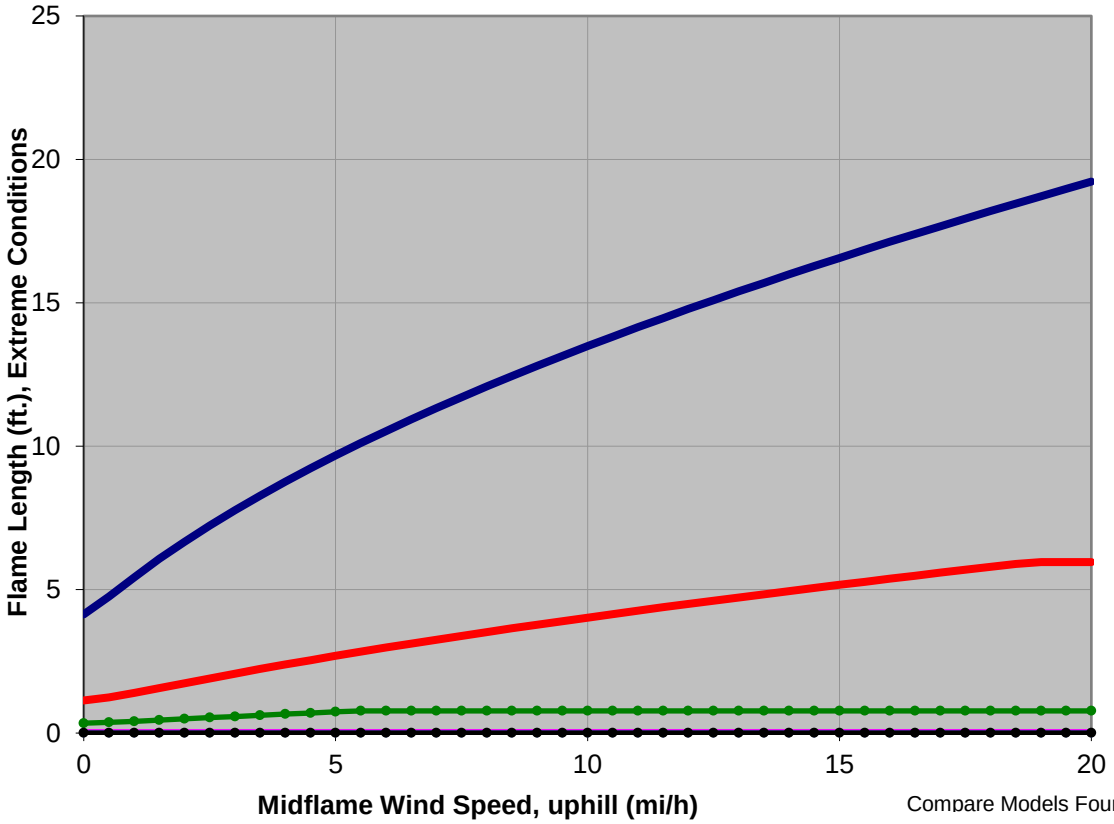
Thinning, mastication

In the stands with a large shrub or sapling component, fuels treatment may include masticating surface and ladder fuels. These areas will be evaluated after harvest for the most efficient follow-up fuels treatment. Higher initial average flame lengths, rates of spread, and fire intensity and are expected resultant of this treatment. These negative effects are expected to persist until the masticated fuels decompose.

Chart Series 1 illustrates BehavePlus comparative predicted flame lengths of the current fuel models compared to the fuel model expected from thinning, piling and burning, and underburning. Average flame lengths are predicted to remain under one foot, even in extremely dry, windy conditions. Overall Flame lengths are expected to remain lower than the existing condition for many years.

Chart Series 1. Flame Lengths

Blue: TU5 Very High Load, Dry Climate Timber-Shrub
Red: TL5 High Load Conifer Litter
Green: TL1 Low Load Compact Conifer Litter



Compare Models Four With Landfire.

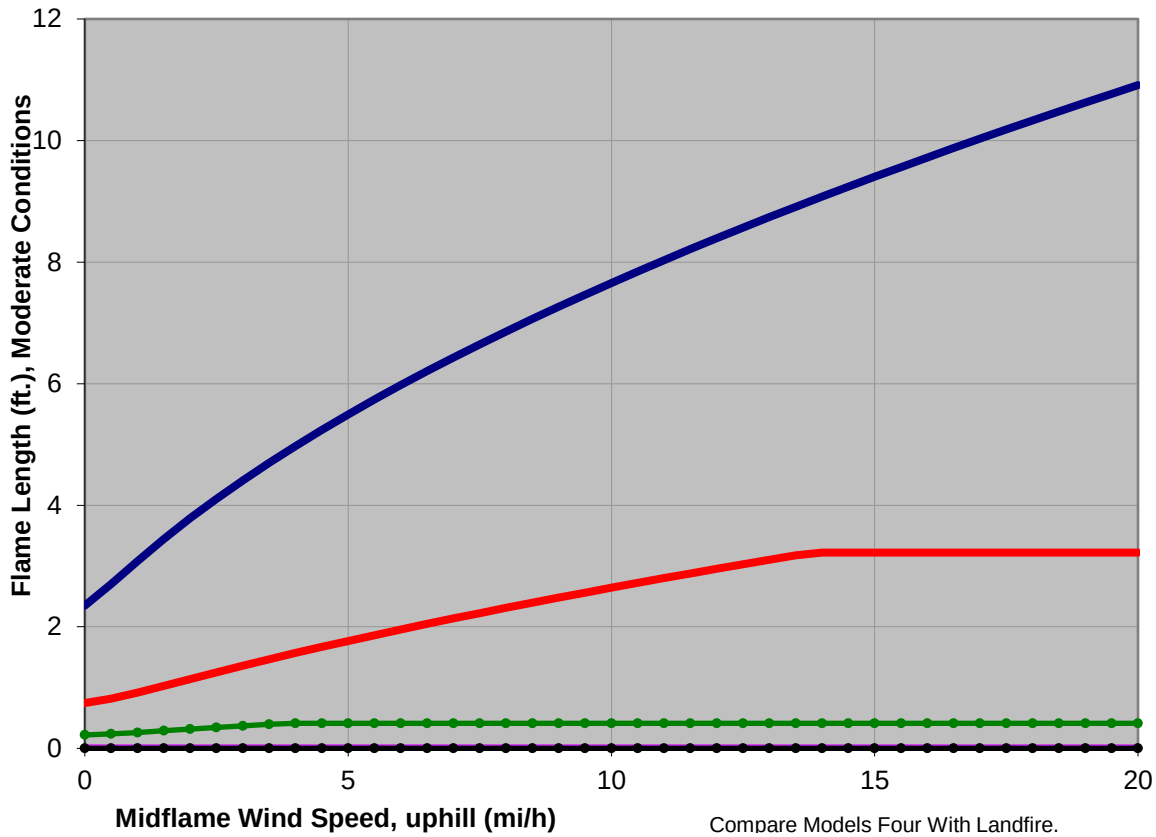
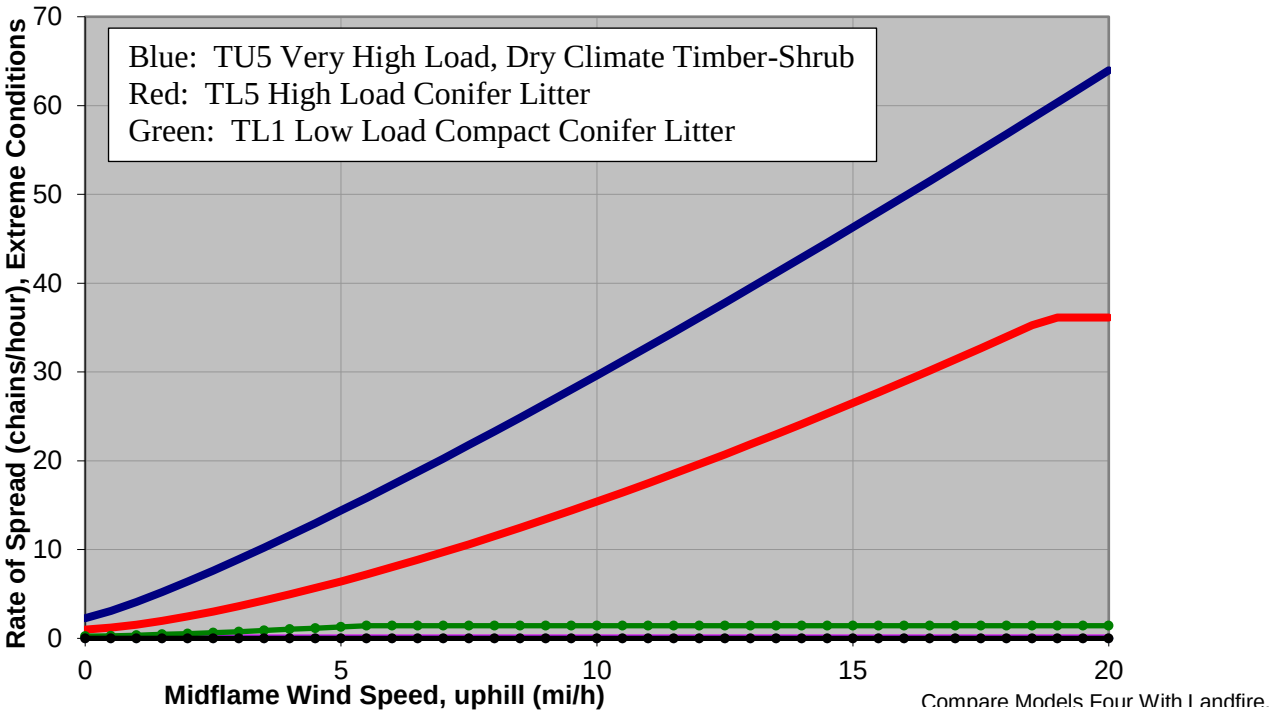


Chart Series 2 illustrates comparative predicted rates of spread of the current fuel models compared to the fuel model expected from the proposed action. Average rates of spread are predicted to remain well under ten chains per hour, even in extremely dry, windy conditions. Overall rates of spread are expected to remain lower than the existing condition for many years.


Blue: TU5 Very High Load, Dry Climate Timber-Shrub
Red: TL5 High Load Conifer Litter
Green: TL1 Low Load Compact Conifer Litter
Rate of Spread (chains/hour), Extreme Conditions
0
10
20
30
40
50
60
70
0
5
10
15
20
Midflame Wind Speed, uphill (mi/h)
Compare Models Four With Landfire

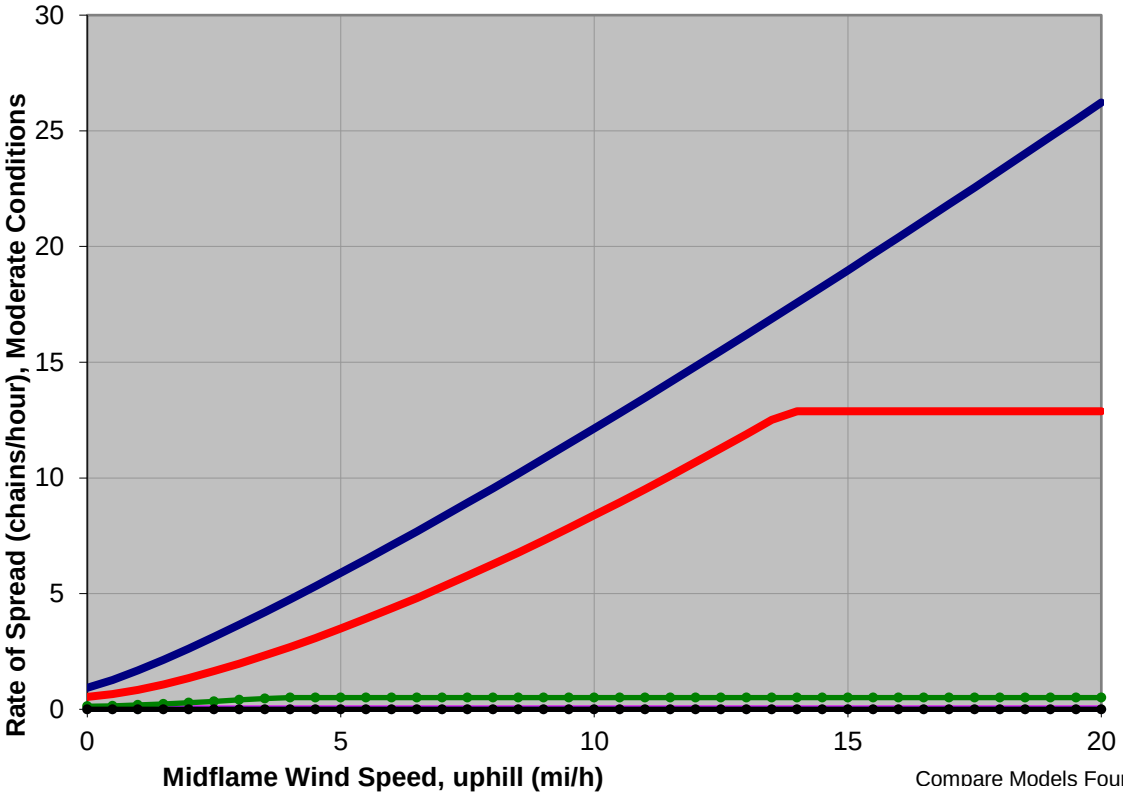
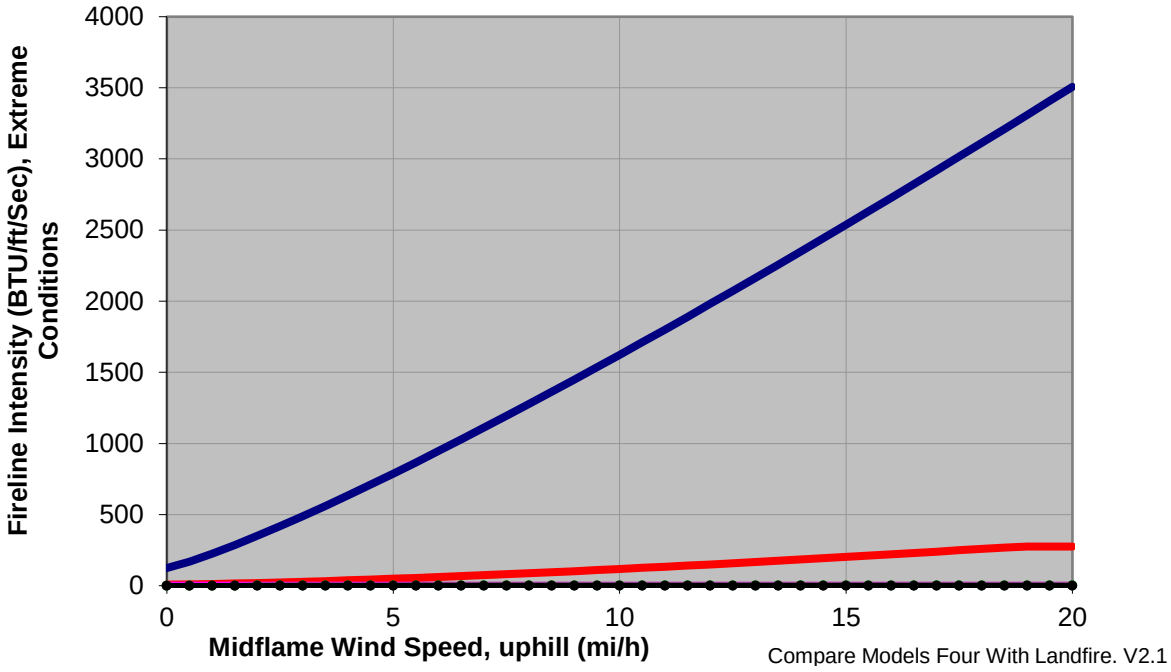
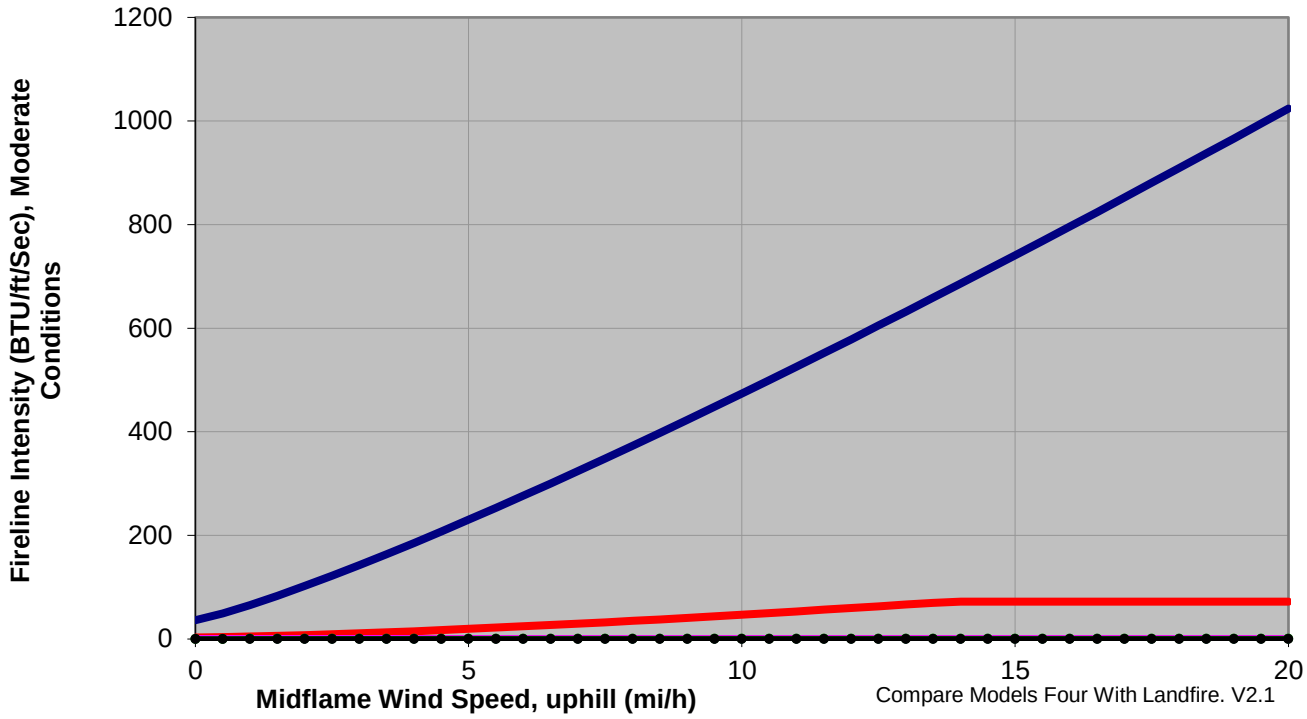


Chart Series 3 illustrates comparative predicted fireline intensity of the current fuel models compared to the fuel model expected from thinning, piling, pile burning, and underburning in the harvest units, and underburning in the prescribed fire only units. Fireline intensity is predicted to remain under 100 btu/ft/sec, even in extremely dry, windy conditions. Overall Fireline intensity is expected to remain lower than the existing condition for many years.

Chart Series 3.

Blue: TU5 Very High Load, Dry Climate Timber-Shrub
Red: TL5 High Load Conifer Litter
Green: TL1 Low Load Compact Conifer Litter





Summary of Direct and Indirect Effects for Alternative 1

The treatments under the proposed action are located in the Sugar Pine Reservoir recreation area, and Big Oak Flat, where dense stands of even-aged ponderosa pine and mixed conifers are succumbing to bark beetle attacks. Newly killed trees (standing, with needles and twigs still suspended) present an unbroken ladder of volatile fine fuels from the surface to the crowns of any trees still living. If the dead trees and logs were left in place, suspended dead fuel would fall to the ground, beginning with finer fuels, and ending when the larger snags fall. Dead surface fuel loads would increase, increasing the potential for high intensity fire for many years, until they began to decompose.

Although the "footprint" of treatment areas under the proposed action represents a relatively small percentage of the overall analysis area, the combined effects of thinning, ladder fuels removal, surface fuels treatment and prescribed burning have the greatest potential to change wildfire behavior potential within and beyond the actual treated areas. This change in fuel loading and composition is expected to reduce wildfire intensities and rates of spread for several years. Future (and inevitable) wildfires will be less intense and safer to manage within and adjacent to the treated areas. The proposed treatments are expected to be effective directly in and adjacent to the treated areas, and within the analysis area.

Modifying forest structure and treating surface fuels create fire resilient forests (Pollet and Omi 2002; Graham et al. 2004) and restore the ecological characteristics associated with high frequency, low to moderate intensity fire regimes (Kilgore 1973).

Cumulative Effects for Alternative 1

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been impacted by innumerable actions over the last century (and beyond), and trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions. Additionally, focusing on the impacts of past human actions risks ignoring the important residual effects of past natural events, which may contribute to cumulative effects as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Third, public scoping for this project did not identify any public interest or need for detailed information on individual past actions. Finally, the Council on Environmental Quality issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions. The cumulative effects boundaries considered in this analysis begin with the proposed treatment areas themselves. Changes in fire behavior potential are most readily evident and easily modeled within the treated areas.

The proposed treatments are also expected to positively influence wildfire behavior outside of the treated areas. (Finney 1999) suggests that fire spread rates can be reduced, even outside of treated areas, if a fire is forced to flank areas where fuels have been reduced or otherwise modified. The treated areas would slow the spread and reduce the intensity of oncoming fires, thereby reducing severe fire effects in both treated and untreated areas. Expected effects of the Sunny South proposed actions are less intense, more easily and economically managed future wildfires within the entire Sunny South analysis area.

Cumulative Effects Summary for Alternative 1

Effects of past, present, and future actions.
The Deadwood, North Divide, and Shirttail Succor Oak thinning and fuels treatment projects illustrate the fire behavior modification potential of projects similar to the Sunny South Project. Thinning, mastication, and underburning associated with these projects have resulted in open stands of healthy, multi-aged mixed conifer forests, increased species diversity, less insect related mortality, and increased wildfire resilience in and adjacent to the project areas. Potential future projects include additional phases of thinning and fuels treatments in response to the ongoing insect mortality epidemic. The proposed Sunny South treatments will help maintain and expand the system of fuels reductions, potentially affecting future wildfires across the analysis area. The Sunny South project, combined with past, present and reasonably foreseeable future actions described above, would have potentially significant positive cumulative effects on wildfire control operations within the Sunny South analysis area.

Alternative 2, No Action

Direct and Indirect Effects Analysis

Under this alternative, no treatments would occur in any areas, and the trend of increasing stand replacing wildfire, with associated ecosystem impacts, will not change. High snag densities and a complex arrangement of fallen trees, broken tops and branches intermixed and suspended within an increasingly heavy shrub component would eventually limit the ability of firefighters to safely and effectively control future wildfires, particularly in communities or recreation areas. Because the Tahoe National Forest Fire Management Plan (TNF FMP) requires all wildfires be fully controlled as soon as possible, naturally occurring low intensity fires will be extinguished upon discovery. As wildfire intensities or a high volume of dead and dying trees preclude direct suppression with ground forces, indirect tactics, heavy equipment and aircraft would be utilized. Burned areas and suppression and emergency rehabilitation costs would increase.

Cumulative Effects

While the large dead standing and fallen snags influence future fire intensity and residence times (the duration of thermal impact of the fire on a specific area) in their immediate vicinity, they do not directly dictate overall fire behavior. Large dead snags primarily affect suppression efforts by posing an unacceptable level of risk to firefighters. Dead snags ignite easily from, and produce, airborne firebrands which complicate control measures. Standing dead trees, burning or not, may fall without warning at any time and in any direction. Decayed trees may fall as a direct, unintentional result of typical fire suppression or other forest activities. Fallen trees block existing roads and trails, and may significantly reduce fuel break construction rates and compromise fire control lines.

Existing and future projects are the same as those listed in the proposed action. The proposed action's objectives of reducing the danger and difficulty of managing future wildfires, reducing snag hazards, and reestablishing the fuel characteristics of resilient, fire-adapted forests would not be met. While the beneficial impacts of past, present, and reasonably foreseeable future actions on fire and fuels management would be realized under

the no action alternative, long-term beneficial effects under the proposed action, particularly those related to opportunities for safe and efficient future fire suppression tactics and mitigating insect caused tree mortality would not be realized. The cumulative effect under the no action alternative would be a landscape increasingly at risk of high intensity wildfires due to the high levels of standing and fallen snags and a high volume of surface and ladder fuels.

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS TO AIR QUALITY

Air Quality Standards, Laws and Responsible Agencies

Air quality is managed through federal, state, and local laws and regulations. The Environmental Protection Agency (EPA) has the primary federal role of ensuring compliance with the requirements of the Clean Air Act (CAA). The EPA issues national air quality regulations, approves and oversees State Implementation Plans (SIPs), and conducts major enforcement actions. States and local Air Pollution Control Districts (APCDs and Air Quality Management Districts (AQMDs) have the primary responsibility of carrying out the development and execution of SIPs, which must provide for the attainment and maintenance of air quality standards.

The state of California also sets Ambient Air Quality Standards which must be equal to or higher than the national standards. Since the state of California has an approved SIP, the enforcement of the CAA is primarily carried out by the California Air Resources Board (CARB), with assistance from the EPA in the areas of scientific research, expert studies, engineering designs and money to support clean air programs.

Attainment Status

The original Air Quality Act was passed in 1963. This act was followed by the Clean Air Act Amendments in 1970, 1977, and 1990. The Clean Air Act Amendments of 1970, Section 109, requires the EPA to set National Ambient Air Quality Standards for pollutants considered harmful to public health and the environment. These pollutants include carbon monoxide (CO), lead, nitrogen dioxide (NO2), and particulate matter less than 10 microns in diameter (PM10), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), ozone, and sulfur dioxide. These are called criteria air pollutants because the agency has regulated them by first developing health-based criteria (science-based guidelines) as the basis for setting permissible levels. One set of limits (primary standard) protects health; another set of limits (secondary standard) is intended to prevent environmental and property damage. A geographic area that meets or surpasses the primary standard is called an attainment area; areas that don’t meet the primary standard are called nonattainment areas. The current attainment status for the Mountain Counties Air Basin, the location of the Sunny South Project is shown in the table below.

Current State and Federal Attainment Status For the Mountain Counties Air Basin*		
Criteria Pollutant	**State Attainment Status**	**Federal Attainment Status**
Carbon Monoxide	Unclassified	Unclassified/Attainment
Lead	Attainment	Unclassified/Attainment
Nitrogen Dioxide	Attainment	Unclassified/Attainment
PM10	***Non-attainment***	Unclassified
$PM_{2.5}$	Unclassified	Unclassifiable/Attainment
Ozone	***Non-attainment***	***Non-attainment***
Sulfur Dioxide	Attainment	Unclassified/Attainment

*Source: California Environmental Protection Agency, Air Resources Board

Non-Attainment Pollutants

Currently, Placer County is not within California state attainment standards for ozone or PM 10. Ozone is a severe eye, nose, and throat irritant and increases susceptibility to respiratory infections. It is an oxidant, and can cause substantial damage to synthetic rubber, textiles, and other materials. Ozone also produces leaf discoloration and cell damage in plants. Ozone is not emitted directly, but is formed by a photochemical reaction in the atmosphere. Ozone precursors, which include volatile organic compounds and oxides of nitrogen (NOX), react in the presence of sunlight to form ozone. Because photochemical reaction rates depend on air temperature and the intensity of ultraviolet light, ozone is primarily a summer air pollution problem. PM10 are particles of solid matter suspended in air. Sources of PM10 can be manmade or natural. Naturally occurring PM10 may originate from dust, wildfires or plant pollen. Human activities, such as the burning of fossil fuels in vehicles, prescribed fire and heavy traffic on dirt roads can also generate significant amounts of PM10. Increased levels of fine particles in the air are linked to health hazards such as heart disease, altered lung function and lung cancer.

Since alternative-generated emissions will be spread over several years, implementation of the project is not expected to exceed deminimus thresholds for these criteria pollutants. Emissions will be minimized by the mitigation measures listed below.

Mitigations

Prescribed Burning

Air quality requirements and other weather related constraints are expected to limit the amount of prescribed fire in a given year to levels similar to the range of activity of the last 10 years. In the 2015-2016 burning season the district applied prescribed fire to approximately 500 acres. While there is the potential for an increase in prescribed fire activity in the Mountain Counties airshed, the same restrictions that affect the program on the American River District are likely to limit activity on adjacent federal, state and private lands. State air quality requirements related to prescribed fire are very strict and the regulation of such burning activity is likely to increase. The District is also using more mechanical fuel treatment methods (such as biomass removal and mastication) to reduce the potential for air quality problems associated with prescribed burning.

During the implementation of the Sunny South Project any required air quality coordination would take place between the Forest Service and the Placer County Air Pollution Control District (PCAPCD). This air quality coordination would follow the Smoke Management Guidelines for Agricultural and Prescribed Burning contained in Title 17 of the California Code of Regulations. These Guidelines are intended to provide for the continuation of agricultural burning, including prescribed burning, as a resource management tool, and provide increased opportunities for prescribed burning and agricultural burning, while minimizing smoke impacts on the public. The regulatory actions called for are intended to assure that each air district has a program that meets air district and regional needs.

The Smoke Management Guidelines include a daily burn authorization system that would regulate prescribed burning implemented under the Sunny South Project action alternative. This authorization system is designed to minimize smoke impacts on smoke sensitive areas, avoid cumulative smoke impacts, and prevent public nuisance. The burn authorization system would not allow more burning on a daily basis than is appropriate for the meteorological or air quality conditions. The system specifies the amount, timing and location of each burn event. The burn authorization system is required to consider the following factors:

- Current and predicted ambient air quality.
- Meteorological conditions expected during burning, including wind speeds and directions at the surface and aloft, and atmospheric stability.
- Types and amounts of materials to be burned.
- Location and timing of materials to be burned.
- Locations of smoke sensitive areas.
- Smoke from all burning activities, including burning in neighboring air districts or regions which may affect the district or region.

Mitigation Measures to reduce Smoke Emissions from Prescribed Fire

Proper mitigation measures to meet air quality requirements would be implemented under the Sunny South Project. A prescribed fire planner would coordinate with the PCAPCD to mitigate emissions from fuel reduction burning. Burning permits would be acquired from the PCAPCD. The Air Quality District would determine permissive burn days. The CARB

provides daily information on “burn” or “no burn” conditions. Burn plans would be designed and all fuel reduction burning would be implemented in a way to minimize particulate emissions. Prescribed fire implementation would coordinate daily and seasonally with other burning permittees to help meet air quality standards. Because of the mitigation measures applied and coordination with the CARB, any impacts are expected to be minimal.

Particulate emissions from prescribed fire would be minimized by utilizing one or more of the following techniques:

Reduction:

- Limit total mass of material burned
    - Whole tree yard activity fuels in commercial thinning units.
    - Make activity fuels available for biomass utilization where feasible.
- Encourage high-efficiency combustion
    - Encourage the flaming phase of combustion.
    - Limit the smoldering phase of combustion.

Dilution:

- Reduce the rate of release of emissions per unit area.
    - Stagger ignitions temporally and spatially.
    - Burn during optimum meteorological conditions for smoke dispersal.
    - Minimize burning when down slope flows of cool dense air may cause smoke to concentrate in low areas.
    - Coordinate daily and seasonally with other burning permittees to help meet air quality standards.

Class 1 Prevention of Significant Deterioration (PSD) Areas.

Class 1 areas include all international areas and National Parks greater than 6000 acres, national wilderness areas greater than 5000 acres that existed on August 7, 1977. This class provides the most protection to pristine lands by severely limiting the amount of additional man-made air pollution which can be added to these areas. The closest Class 1 PSD area to the Sunny South Project site is the Desolation Wilderness, 35 miles southeast of the project area. Prevailing winds, local topography, the limited volume of potential pollution outputs from dust and prescribed fire smoke from the Sunny South Project, and the distance from the project area would make any impact to this Class 1 area unlikely.

Control of Dust

Fugitive dust could be caused by the construction and reconstruction of roads, skidding of logs and biomass material, hauling operations on native or aggregate surfaced roads, and road maintenance and repair activities. Dust abatement techniques would be applied as necessary to all these activities to minimize unsafe conditions and meet air quality requirements. The primary techniques used for dust abatement is:

- The application of water during operations
- Application of dust palliatives such as magnesium or calcium chloride to roads to reduce dust as necessary

Because of the size of the Sunny South Project area, the small amount and dispersed nature of dust producing activities, and the favorable weather conditions within the normal operating season, in combination with the dust abatement techniques used, any adverse effects from dust are expected to be minimal.

Diesel Engine and other Motor Vehicle Emissions

The potential for adverse effects from emissions from diesel engines and other motor vehicle is very low because of the relatively small number of vehicles from all forms of activities in the project area. The project area is a very rural environment with a minimal amount of commercial or residential development. It has a high level of air quality year-around. Recreational activity and forest management activities such as timber harvests are widely dispersed temporally and spatially on both National Forest and private land. In addition, the Federal and State requirements designed to protect and maintain air quality for diesel and other motor vehicle engines are applicable to all the equipment and recreational vehicles that operate within the project area. For these reasons, any adverse effects from the exhaust associated with diesel and other motor vehicles are expected to be minimal to the point of non-significance.

Cumulative Effects on Air Quality.

The Sunny South Project is dispersed through a large rural mountainous area with a low population density. Air quality is good throughout the year. The primary human activities that might affect air quality are logging and other construction activities that produce dust or the use of prescribed fire. Because this project area is large and the expected activities would be widely dispersed over space and time, and mitigations measures would be applied, both activity generated dust and smoke from prescribed fire that would result from cumulative past, present and future foreseeable actions are expected to remain at levels that meet both state and federal air quality standards for this area.

Because of the distances from the proposed project area, the nature of prevailing winds and the amount and timing of occurrences of dust and smoke, no communities are expected to experience adverse air quality effects from actions proposed by the Sunny South Project. Any adverse effects from prescribed burning would be minimized by the implementation of air quality regulation requirements and the standard mitigation measures applied to the application of prescribed fire on the American River Ranger District and adjacent National Forest, public and private lands.

Because of the distances from other potential sources of smoke (El Dorado National Forest and privately owned forest land), and the nature of the prevailing winds, cumulative smoke

effects from these other sources in combination with the potential effects from the Sunny South Project are very unlikely

Since the proposed action would follow the Smoke Management Guidelines for Agricultural and Prescribed Burning contained in Title 17 of the California Code of Regulations it is expected that the current high level of air quality in the Sunny South Project Area and the American River Ranger District would be maintained. Overall smoke emissions from prescribed fire on the American River Ranger District are expected to remain within a range similar to the current level. The actual amount of emissions would vary from year to year based on weather and fuel conditions, and on the requirements for smoke management that result from coordination with the California Air Resources Board (CARB) within the Mountain Counties Air Quality Management District.

Increasingly, the American River Ranger District has used alternative methods to prescribed fire, such as thinning and biomass removal, that result in a net decrease in the potential for smoke emissions from forest fuels from both prescribed fire and wildfire.

Definitions of Terms Used

British Thermal Units (BTU): A unit of work equal to about 1055 joules. One BTU is the amount of work needed to raise the temperature of one pound of water by one degree Fahrenheit. One four-inch wooden kitchen match consumed completely generates approximately 1 BTU.

Fireline Intensity: The numerical product of a fire's rate of spread, fuel consumption, and heat yield at a given point on a fire's perimeter, expressed in BTUs per foot per second.

Flame Length: distance from the ground to the tip of a flame at the leading edge.

Masticate, mastication: A method of vegetation/fuels treatment where understory vegetation (shrubs and saplings) is mechanically shredded and scattered. Mastication eliminates ladder fuels but does not reduce surface fuel volumes.

Rate of Spread: The horizontal distance that the flame zone moves per unit of time, expressed as rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in burned area.

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